INTEGRA MICROWAVE

MODEL TMF-1800

TUNABLE MICROWAVE FILTER

OPERATION & SERVICE MANUAL

LABORATORIES INC.

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INTEGRA MICROWAVE

MP MASTER

MA34339

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MODEL TMF-1800

TUNABLE MICROWAVE FILTER

OPERATION & SERVICE MANUAL

TMF-1800 TMF

TMF-1800H-1178

Tom 1-1/4"

WARRANTY

Integra warrants this instrument to be free from defects in material and workmanship for one year from the date of delivery. Damage due to accident, abuse or improper operation, is not covered by the warranty. Removal, defacement, or alteration of any serial or inspection label, marking or seal, may void the warranty. Integra will repair or replace at its option, any components of this instrument which prove to be defective during the warranty period, provided the entire instrument is returned prepaid to Integra or its authorized service facility.

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ASSISTANCE

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TABLE OF CONTENTS

1. GENERAL INFORMATION
   1.1 Introduction
   1.2 R.F. Filter Specs
   1.3 Control Unit Specs

2. OPERATION
   2.1 General
   2.2 Front Panel Features
   2.3 Rear Panel Features
   2.4 Typical Appplications

3. CALIBRATION
   3.1 Internal DVM Calibration
   3.2 Voltage Calibration
   3.3 Frequency Calibration

4. THEORY OF OPERATION
   4.1 System Diagram
   4.2 Function Controller
   4.3 Converter Board
   4.4 Display Board
   4.5 Sweep Generator

5. CIRCUIT DESCRIPTION
   5.1 Function Controller
   5.2 Converter Board
   5.3 Display Board
   5.4 Power Supply
   5.5 Sweep Generator

FIGURES:
  1- Front Panel & R.F. Head
  2- Rear Panel
  3- Calibration Set-Up
  4- TMF Block Diagram
  5- Component Location

SCHEMATICS & ASSEMBLY DRAWINGS
  Interconnect Diagram
  Function Controller Board
  Converter Board
  Sweep Generator
  Display Board

PARTS LIST
  Function Controller
  Converter
  Display
  Panel Regulator
  Sweep Generator

1. GENERAL INFORMATION

1.1 Introduction

The Model TMF 1800 TUNABLE MICROWAVE FILTER provides a new microwave design, measurement and production test capability not previously available in a complete instrument. Several models cover the following frequency ranges:

TMF-1800	1-18GHZ	3-STAGE
TMF-1800A	4-26GHZ	3-STAGE
" " -03	1.8-26GHZ	OPTION
TMF-1800B	2-18.5GHZ	3-STAGE
TMF-1800C	2-18.5GHZ	1-STAGE

They can be manually or electronically swept over their entire range, conveniently separating or isolating signals on the basis of frequency. The filter can be remotely located. The key to the TMF 1800 performance is a 3-pole yttrium-iron-garnet (YIG) filter designed for maximum tuning range and minimum band-width. The 3 dB bandwidth is nominally 15 to 25 MHz for 1 to 8 GHz, 25-50 MHz for 8-14 GHz and 35-70 MHz for 14-18 GHz; selectivity is 18 dB/octave; off resonance isolation is typically 70 to 80 dB.

The TMF-1800C is a single stage filter with a nominal bandwidth of 20-60MHZ; selectivity is 6 DB/octave; off resonance isolation is 30 DB; insertion loss <3DB.

The sharp selectivity of the Model TMF 1800 allows signal separation and analysis over much larger dynamic ranges than previously feasible. As a tuned preselector for super-hetro-dyne spectrum analyzers, it can eliminate spurious intermodulation products, images, and IF signal feed-through extending the dynamic range of conventional sweep or fixed tuned signal sources, it can extend the dynamic range of measurement setups by reducing harmonics and nonharmonically related spurious signals by over 60 dB.

These units contain the automatic and manual controls needed for a variety of applications. For example, it can convert a comb generator output to a multi-octave signal source by selectively tuning each frequency; it can simplify intermodulation distortion measurements in amplifiers and converters; it can eliminate ambiguity in radio frequency interference (RFI) measurements. In RFI measurements, it also replaces five individual octave band filters that are required to get equal coverage.

1.2 Remote Filter Specifications

	-- MODEL --	
	TMF 1800	TMF 1800A
Number of Stages	3	3
Frequency Range	1-18 GHz	4-26.5 GHz
Bandwidth (-3 dB)	15-70 MHz	20-90 MHz
Insertion Loss (max)	8 dB	8 dB
Passband Ripple and Spurious (max)	1.5 dB	2 dB
Off Resonance Isol. (min)	70 db	60 db
Limiting Level (min)	+10dBm	+10dBm
Off Resonance Spurious (min)	45 dB	45 dB
Selectivity (nom)	18 dB/Oct.	18 dB/Oct
VSWR (typ)	2 : 1	2 : 1
Impedance (nom)	50 Ohms	50 Ohms
Hysteresis (max)	20 MHz	24 MHz
Max. Input Power	+30 dBm	+30 dBm
Connectors	SMA Jack (3mm)	SMA Jack (3mm)
Size (WxHxL)	3" x 3" x 4"	3" x 3" x 4"

1.2 Remote Filter Specifications(CON'T) -- MODEL --

	TMF 1800B	TMF 1800C
Number of Stages	3	1
Frequency Range	2-18.5 GHZ	2-18.5 GHz
Bandwidth (-3 dB)	15-70 MHz	15-70 MHz
Insertion Loss (max)	8 dB	3 dB
Passband Ripple and Spurious (max)	1.5 dB	0.5 dB
Off Resonance Isol. (min)	70 db	30 db
Limiting Level (min)	+10dBm	+10dBm
Off Resonance Spurious (min)	45 dB	30 dB
Selectivity (nom)	18 dB/Oct.	6 dB/Octave
VSWR (typ)	2 : 1	2 : 1
Impedance (nom)	50 Ohms	50 Ohms
Hysteresis (max)	20 MHz	20 MHz
Max. Input Power	+30 dBm	+30 dBm
Connectors	SMA Jack (3mm)	SMA Jack (3mm)
Size (WxHxL)	3" x 3" x 4"	3" x 3" x 4"

1.3 Control Unit Specifications

Frequency Accuracy	0.1% + 10MHz
Frequency Resetability	10 MHz typ.
Operating Modes:	
CW	Frequency selected by F1, F2, or Fo, dependent on selected display F1, F2, or Fo (no sweep)
SWEEP	Sweep from F1 to F2
EXT.	External drive voltge 0 to +10V (sweeps from F1 to F2 setting, typ. 1 ms time constant)
Sweep Rate	.1 Hz, 1 Hz, 10 Hz, 30 Hz (line sync)
Disply Modes	
F1	Displays F1 - frequency
Fo	Displays Fo - frequency
F2	Displays F2 - frequency
Display	5 digit, Light Emitting Diodes
Calibrate Switch	Eliminates hysteresis for highest tuning accuracy.
Horizontal Sweep Output	0 to +10V
Negative Blanking Output	0 to -3V pulse during retrace.
Analog Output	Voltage proportional to frequency 0.5V/GHz
Temperature Range	0 to 50 degrees C
Control Unit Size (WxHxD)	8 1/2" x 5 1/4" x 12 3/4"
AC- Power	115 VAC, 60 Hz, 50 Watts max.

NOTES

2.0 OPERATION

2.1 GENERAL

The TUNABLE MICROWAVE FILTER is a versatile, wide frequency range laboratory instrument that can conveniently separate or isolate signals on the basis of frequency. The control unit contains all the necessary controls and digital frequency display. The RF-Head contains a yttrium-iron-garnet (YIG) filter that can be placed remote from the control unit.

2.2 FRONT PANEL FEATURES

FIG. 1 shows all the front panel controls.

1 MODE (Buttons)

POWER This is the power switch. When power is applied to the instrument the Frequency display is illuminated.

CW This selects the CW-mode NO SWEEP is generated. When F1 - DISPLAY is selected the F1 control determines the filter frequency setting. When F2 DISPLAY is selected the F2 control sets the filter frequency that will be displayed. When Fo DISPLAY is selected the Fo control sets the frequency.

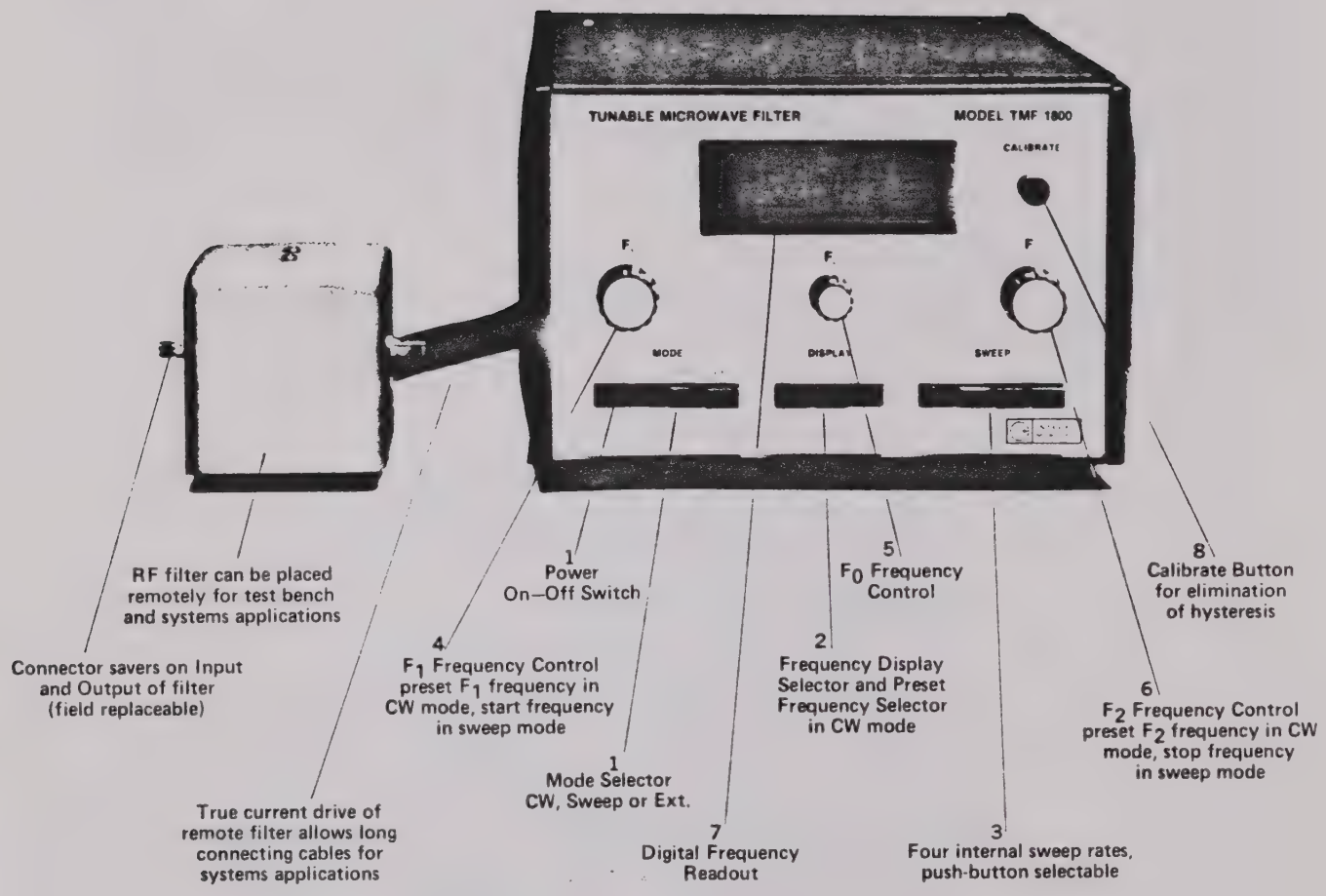

TUNABLE MICROWAVE FILTER
MODEL TMF 1800
CALIBRATE
MODE
DISPLAY
SWEEP
RF filter can be placed remotely for test bench and systems applications
Connector savers on Input and Output of filter (field replaceable)
True current drive of remote filter allows long connecting cables for systems applications
4 F_1 Frequency Control preset F_1 frequency in CW mode, start frequency in sweep mode
1 Power On–Off Switch
1 Mode Selector CW, Sweep or Ext.
7 Digital Frequency Readout
2 Frequency Display Selector and Preset Frequency Selector in CW mode
5 F_0 Frequency Control
3 Four internal sweep rates, push-button selectable
6 F_2 Frequency Control preset F_2 frequency in CW mode, stop frequency in sweep mode
8 Calibrate Button for elimination of hysteresis

FIGURE 1

FRONT PANEL

			Fo always tunes between F1 and F2. This allows presetting three (3) independent filter frequencies.
		SWEEP	This selects the sweep mode. The filter is swept from the F1 - frequency to the F2 frequency at a rate controlled by the SWEEP selector.
		EXT	This selects the EXT. mode. A O to +10V signal applied to the EXT. SWEEP input (rear panel). Tunes the filter between the F1 and F2 frequency setting.
2	DISPLAY	F1	Display shows the F1 frequency in CW - mode and shows the start frequency in sweep-mode.
		Fo	Display shows the Fo frequency in CW mode and reads zero in Sweep-mode.
		F2	Display shows the F2 frequency in CW mode and shows the stop frequency in sweep-mode.
3	SWEEP	30	Selects a sweep rate of 30 sweeps per second.
		10	Selects a sweep rate of 10 sweeps per second.
		1	Selects a sweep rate of 1 sweep per second.
		.1	Selects a sweep rate of 1 sweep per 10 seconds.
4	F1 - Control		Controls the F1 frequency setting.
5	Fo - Control		Controls the Fo frequency setting.
6	F2 - Control		Controls the F2 frequency setting.
7	READOUT		Displays the frequency in MHz.

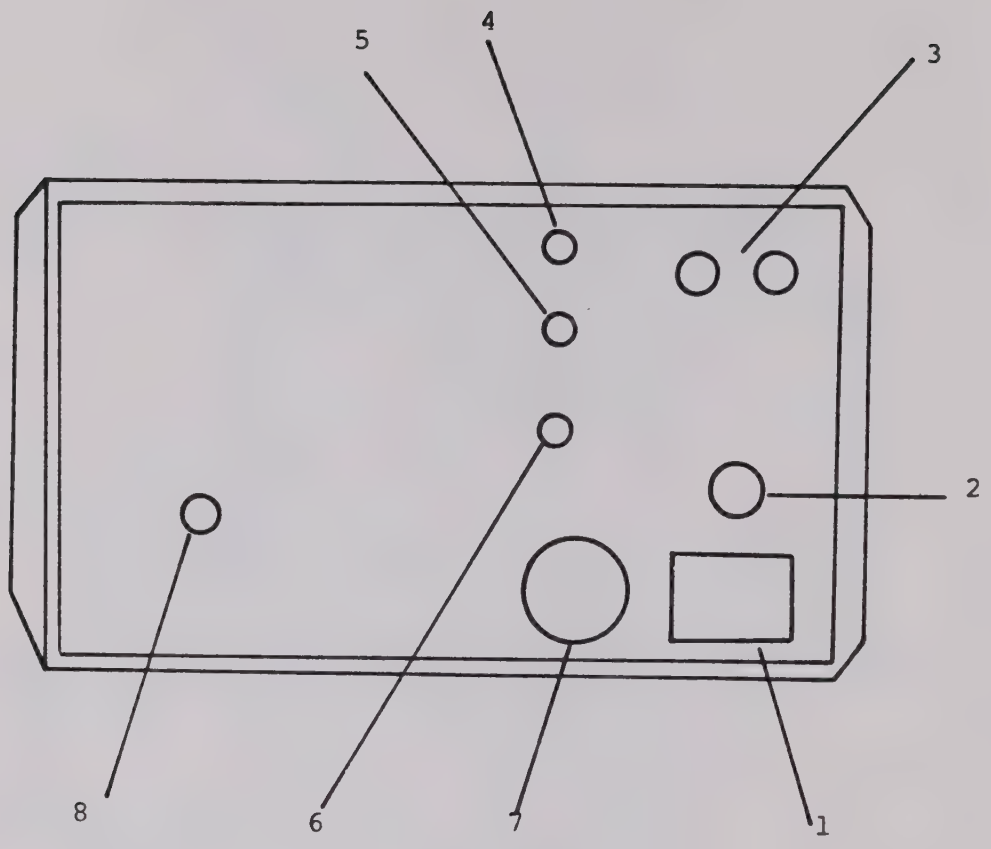


FIGURE 2

REAR PANEL TMF - 1800

8 CALIBRATE This CALIBRATE button is provided to eliminate the hysteresis inherent in any YIG-filter. For highest tuning accuracy this button should be pressed momentarily after tuning of the filter to the desired frequency. When pushed this button removes the drive current to the YIG and sets the filter to "zero" frequency. It can also be used during system calibration for removing a signal without detuning the filter.

2.3 REAR PANEL FEATURES

Fig. 2 show all the rear panel connections.

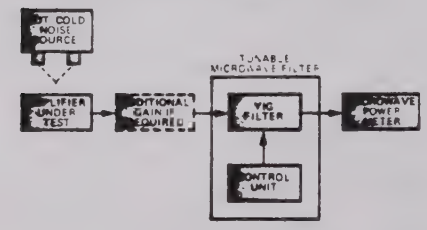
1. POWER INPUT This is the power input connector to the instrument.
2. FUSE This is the line voltage fuse. For 115 VAC operation a 1A - SLOW-BLOW FUSE IS REQUIRED.
3. ANALOG OUTPUT The analog output gives a voltage proportional to the tuning frequency. (0.5V/GHz)
4. EXT. SWEEP An external drive voltage 0 to +10 Volts sweeps the filter from F1 to F2 setting. (typical time constant is 1 millisecond)
5. NEGATIVE BLANKING The negative blanking output gives a -3 volt pulse during the retrace of the sweep.

6.	SWEEP OUT	A 0 to +10 volt sweep voltage is available when unit is in sweep mode.
7.	FILTER	This is the output connector for the RF-filter.
8.	SWEEP ADJ.	Continuous sweep time control.Sweep time range selected on front panel.

2.4 TYPICAL APPLICATIONS

2.4.1 Noise Figure Measurement

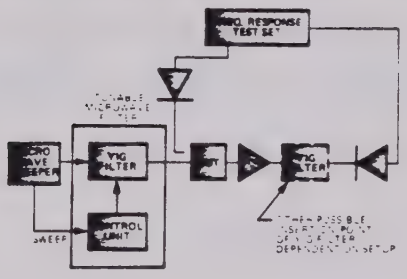
NOISE FIGURE MEASUREMENTS ON BROADBAND AMPLIFIERS



Allows you to make noise figure measurements at any frequency of interest across the amplifier's frequency range. Three frequencies can be preset with the F_1, F_0 and F_2 frequency controls and, for example, can be set at the low end, midband and high end of the frequency band for noise figure measurements.

2.4.2 Elimination of harmonics and spurious signals for high dynamic range measurements.

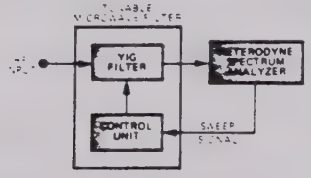
100 dB DYNAMIC RANGE MEASUREMENTS OVER MULTI-OCTAVE FREQUENCY RANGE



Prevents interference from harmonics and spurious signals which would prevent high dynamic range measurements. Allows you to make these measurements over multioctave frequency ranges since all harmonics are eliminated.

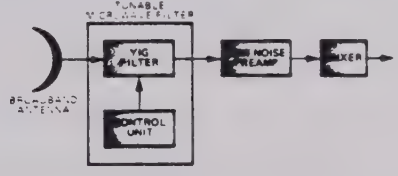
2.4.3 Preselector application for receivers and heterodyne spectrum analyzers.

TRACKING PRESELECTOR FOR HETERODYNE SPECTRUM ANALYZER



Eliminates spurious intermodulation products, images and IF signal feed-through. Can extend the dynamic range by 50 to 60 dB

PRESELECTOR FOR RECEIVERS



Prevents overloading of the preamplifier by strong adjacent signals. Also prevents image responses and can be electronically tuned from a remote station.

3. CALIBRATION

3.1 INTERNAL DVM-CALIBRATION. (RF Head must be connected)

1. Disconnect J2-Z(fig),connect + 9.000V from external power supply to J2-Z and 24(RETURN). Adj. R38 for 18.000 readout on front panel display.
2. Apply 0.500 Volt, adj. R18 for 1000 readout.
3. Repeat 1. and 2. until both correct.
4. Reconnect J2-Z.

3.2 VOLTAGE CALIBRATION

1. Select EXT. MODE. Set F1 fully CCW, F2 fully CCW, adj. R17 for 0.000 V on J1-7 to GND.
2. Apply +10.000 V, F1 fully CCW, F2 fully CW, adj. R22 for +10.000V on J1-7 to GND.
3. Apply +10.000 V, F2 fully CW, F1 fully CW, adj. R7 for +10.000V on J1-7 to GND
4. Select Display F2; Sweep 30; Mode CW. Set F2 to 18000, Switch between CW-Mode and Sweep Mode. Adj. R66 on Converter Board so both modes read same frequency.
5. Select display F1; Sweep 30; Mode CW; set F1 for 1000. Adj. R4 and R25 on Converter Board so both modes read the same (CW & SWEEP).
6. Repeat 4 and 5 until both correct.

3.3 FREQUENCY CALIBRATION

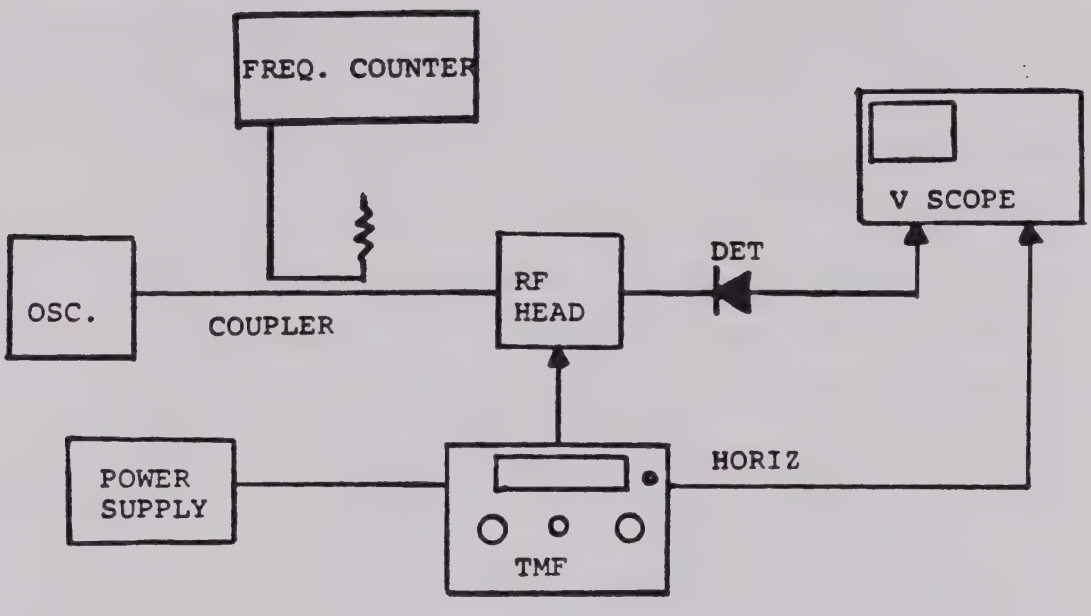


Figure 3
CALIBRATION

1. SET F1 TO 00000, F2 TO 19999; go to EXT. MODE, apply 0.500 volts on ext. sweep (rear panel), adj. F1 so that display reads 1000 (F2 can be used for fine adjust). Adj. R52 for max. detected signal when 1 GHz - signal is going through filter.
2. Divide frequency counter reading by 2 and set external voltage input to this voltage value (I.E: Freq=18GHZ, EXT V=9v). Set TMF display to same as Frequency counter with F1 (F2 fine adj). Adj. R41 for max. detected signal.
3. Repeat 1. and 2. until both correct.
4. Check filter response and, if necessary, correct calibration for -3db bandwidth to be symmetrical around center frequency.
5. Set F1 to read 1000, set F2 to read 15000 on display.
   F1-Display: Adj. R55 for Analog output voltage of 0.500V
   F2-Display: Adj. R58 for Analog output voltage of 7.500V
6. Repeat until both readouts are correct.

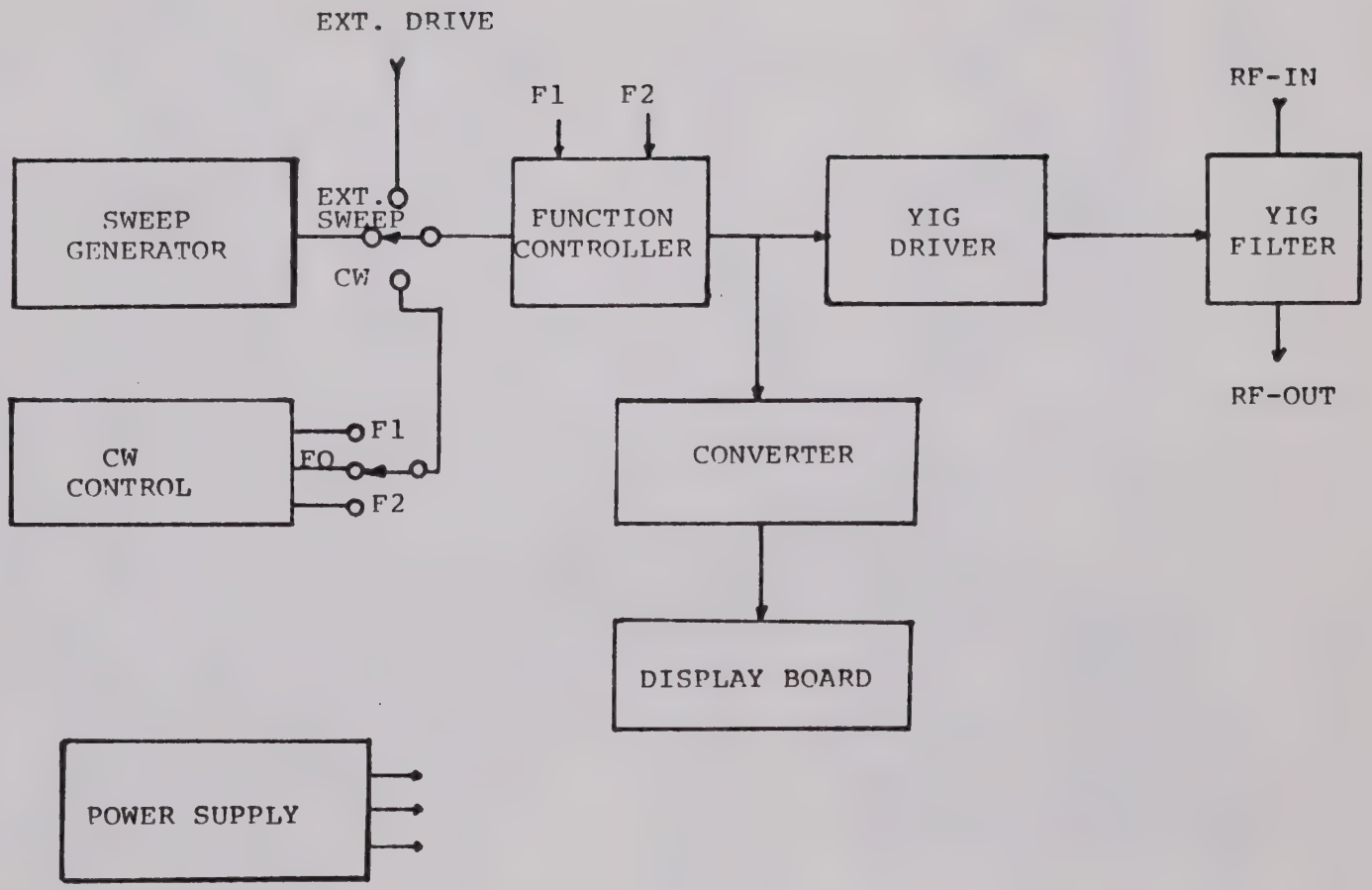


FIGURE 4

TUNABLE MICROWAVE FILTER

SYSTEM DIAGRAM

4. THEORY OF OPERATION

4.1 System Diagram

Fig.4 is a block diagram of the Tunable Filter. The RF-Head contains a band pass YIG Filter consisting of one, two or three stages depending upon the particular model. The Filter is driven by a YIG-Driver which converts the control voltage to a suitable current, that in turn tunes the filter. The same control voltage that is applied to the YIG-Driver is also fed to the converter board and is converted to drive a digital display, indicating the RF-frequency to which the filter is tuned. The Function Controller contains circuitry for selecting the F1 and F2 frequencies that can be set independently of each other. A voltage (0 to +10V) at the input of the Function Controller allows tuning between the F1 and F2 frequency setting. F1 and F2 could be considered the start/stop frequency settings of the 0 to +10V range.

The different operating modes of the Tunable Filter are selected by applying the correct voltage to the Function Controller. For F1 mode, zero voltage is applied;for F2 mode, + 10V is applied, and in the Fo mode a variable voltage (0 to +10V) is applied.

A temperature compensated voltage reference is used to generate the required control voltages. An external 0 to +10V drive voltage can be applied in the F1 - F2 mode making external programming between F1 and F2 possible.

4.2 Function Controller

The Function Controller accepts an input voltage from 0 to +10V. The START/STOP points are set with the F1 and F2 controls. Both F1 and F2 can be set-up independently, without influencing each other. The zero-voltage input will always be F1, and +10V input will always correspond to the F2 setting. Any voltage between 0 and +10V will select a proportional frequency between F1 and F2. The voltage set-up by F1 and F2 is then converted to a proportional current that is used to drive the YIG-Filter.

4.3 Converter Board

The Converter Board provides the temperature compensated reference voltage and converts the voltage, proportional to frequency, to a digital frequency readout. For this purpose, the board contains a complete 4 1/2 digit dual-slope integration type voltmeter. It also contains several buffer amplifiers and an analog switch circuit.

4.4 Display Board

The Display Board accepts the digital information from the Converter Board and displays the frequency.

4.5 Sweep Generator

The Sweep Generator provides an output signal clamped on the top and bottom by the CLAMP circuit, and then amplified, 0 to +10 volts. In the F1-F2 mode this voltage is applied to the DUAL FUNCTION CONTROLLER which sets the F1 and F2 sweep range. The start of the sweep, F1 can be adjusted independently of F2. The end of the sweep (Stop) F2, is independent of F1. This drive voltage is converted to a drive current in the YIG driver. The YIG filter frequency is proportional to the drive current. The analog output amplifier scales the drive voltage proportional to frequency (volts/GHZ).

5. CIRCUIT DESCRIPTION

The interconnect diagram is self-explanatory.

5.1 Function Controller

The Function conroller contains the F1, F2 frequency select and YIG-Driver control circuitry.

IC 1 is an inverting amplifier that amplifies the reference voltage to +10VDC.

IC 2 is a variable gain inverting and offset amplifier.

IC 3 is a fixed inverter with a gain of -1.

IC 4 is a summing amplifier.

IC 5 is an inverting amplifier with a variable gain from 0 to -1.

The gain controls of IC 2 and IC 5 determine the F1 and F2 frequencies of the TUNABLE FILTER.

IC 8 is used as a buffer amplifier with a gain of +1 for the F1 - F2 drive voltage.

IC 9 is the inverting amplifier of the YIG-Driver.

IC 10 is a voltage follower with current booster transistors Q2 and Q3.

5.2 Converter Board

IC 1 through IC 5 form a dual slope integration type digital voltmeter. IC 1 is the integrator, IC 2 the comparator. IC 3 and 4 are used for signal combining and IC 5 contains all the counter, storage, multiplex and housekeeping circuitry for the DVM. Q1 switches the reference voltage to the integrating capacitor C5 Q2 applies the unknown input to C5, and Q3 is used to reset the integrating capacitor C5. Q10 and Q11 form a multivibrator which is used as the clock. IC 5 also multiplexes all the signals for the frequency display. O1 - O4 are the data, and OA - OE are the strobe outputs for the five digit display.

Q14 is an analog switch controlled by Q12 and Q13. IC 7 is a buffer amplifier. IC 10 is a buffer amplifier with a gain of +1. Q18 is used to generate a line sync pulse. IC 13 and IC 14 are inverting amplifiers and used as buffers. MR 1 is a temperature compensated reference zener, and IC 6 is an inverting amplifier for the precision voltage reference.

5.3 Display Board

IC1 is a BCD to 7-segment decoder. Q1-Q5 transistors are for strobing individual displays. R1-R7 are current limiting resistors for the 7-segment displays. C1 and C2 are filter capacitors.

5.4 Power Supply

The power supply transformer has two secondary windings for generating a + and - voltage. Integrated, short circuit proof regulators are used to provide +15V, -15V and +5V.

5.5 Sweep Generator Board

Sweep Generator PCB assembly contains an integrator formed by IC1,IC2, and integrating capacitors C2 through C5. The integrating mode of IC2 (up or down) is controlled by flip-flop IC5A. IC3 is a voltage comparator, that compares the sweep voltage against a fixed positive voltage. When this voltage is reached by the sweep ramp, the comparator triggers IC5A and the integration process starts in the opposite direction. When the negative voltage level is reached, IC4 acts as a comparator amd triggers IC5 (through the INT TRIGGER switch) to again reverse the integration function of IC2. Q1 and Q2 form an additional current source and are turned on during flyback to shorten the fly-back time (except in the .01 - .1 second TIME mode). IC6 clamps the sweep ramp to a fixed voltage at the beginning and end of the sweep. (0 to approx. +6V).

CR10, and Q7, generate a line sync pulse. IC8A and IC8C forms a flip-flop for single sweep triggering. The flip-flop IC5B receives a toggle signal from either LINE sync, EXT trigger, or SINGLE sweep (depending upon the TRIGGER switch setting), and generates a sync pulse which is applied to IC8-pin 9,controlling the start of the sweep by clearing IC5A.

The marker pulses from pin Y and the blanking signal are combined in Q8 through Q16 to form the Z-AXIS-MKR-PEN LIFT signal on pin AA.

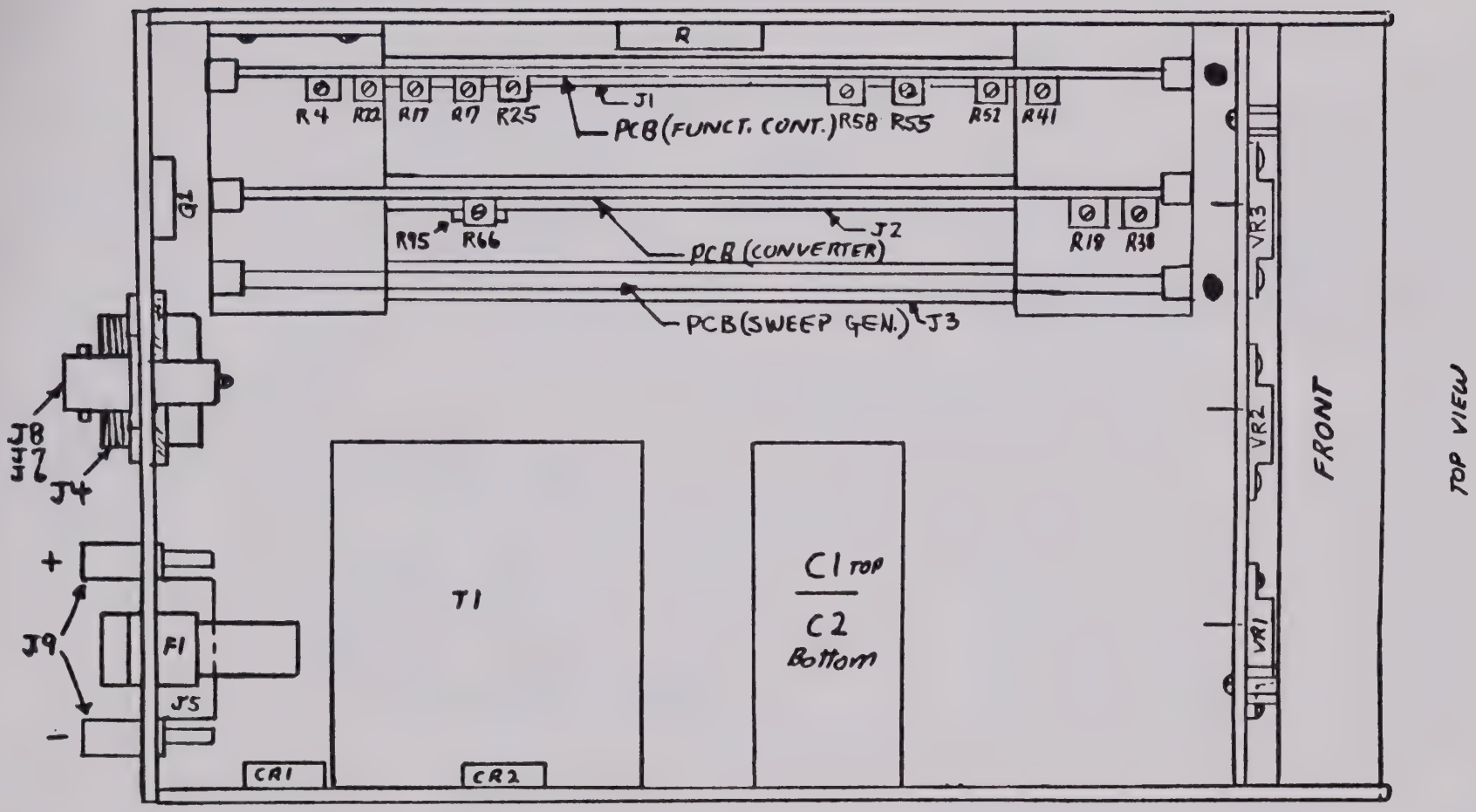
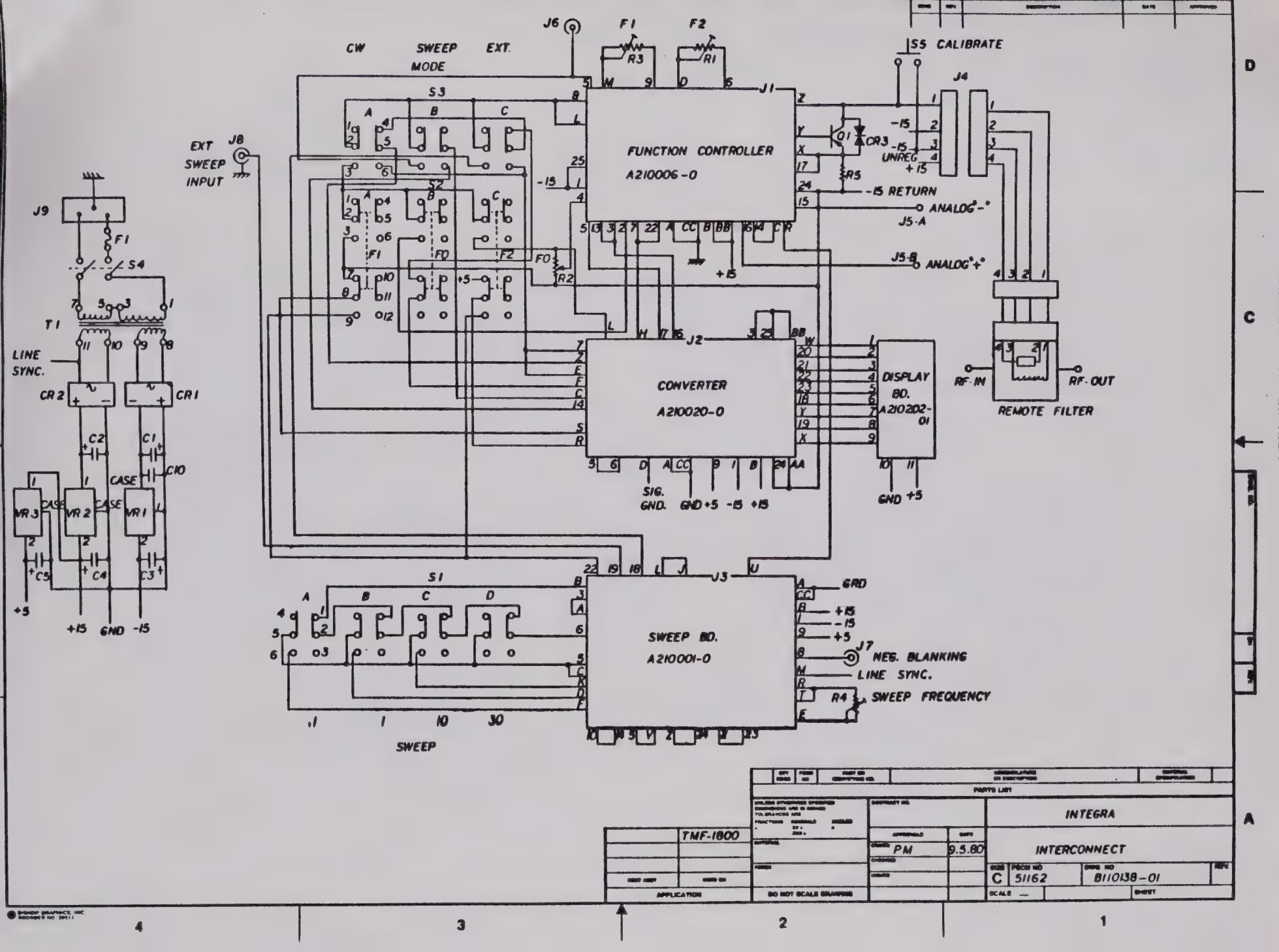


FIGURE 5

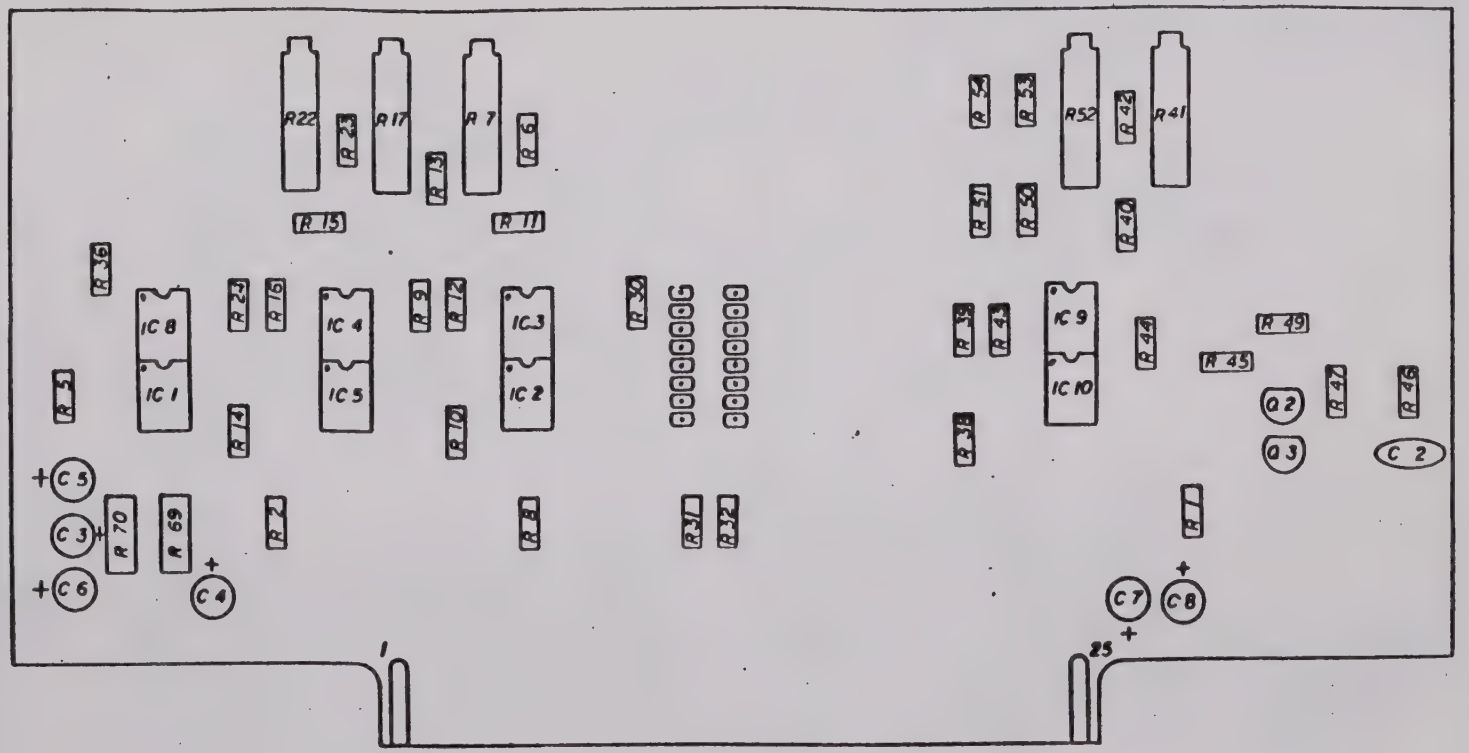
COMPONENTS LOCATOR



	TMF-1800		INTEGRA	
			INTERCONNECT	
		PM 9.5.80	C 51162	B110138-01
APPLICATION	DO NOT SCALE DRAWING		SCALE —	SHEET

4 3 2 1

D C A



		DWM-1800		
		APPLICATION	DO NOT SCALE DRAWING	

PARTS LIST

INTEGRA

FUNCTION CONTROLLER

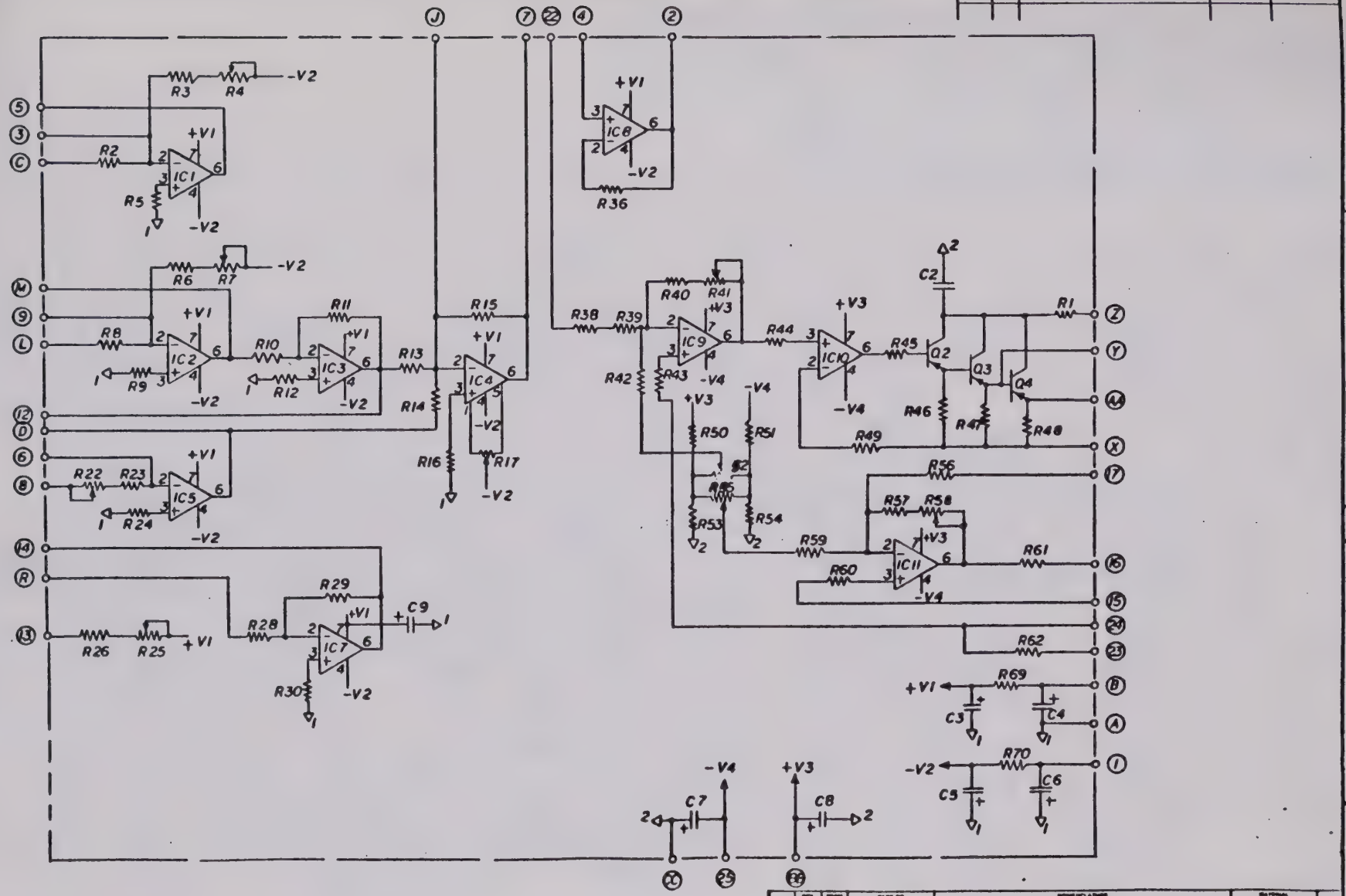
N.P. 8/20/80

C | 51162 | B210006-06

SCALE 2:1

SHEET

4 3 2 1



PARTS LIST

	TMF-1800
DRAWN	P M 8 22 80
DO NOT SCALE DRAWING	

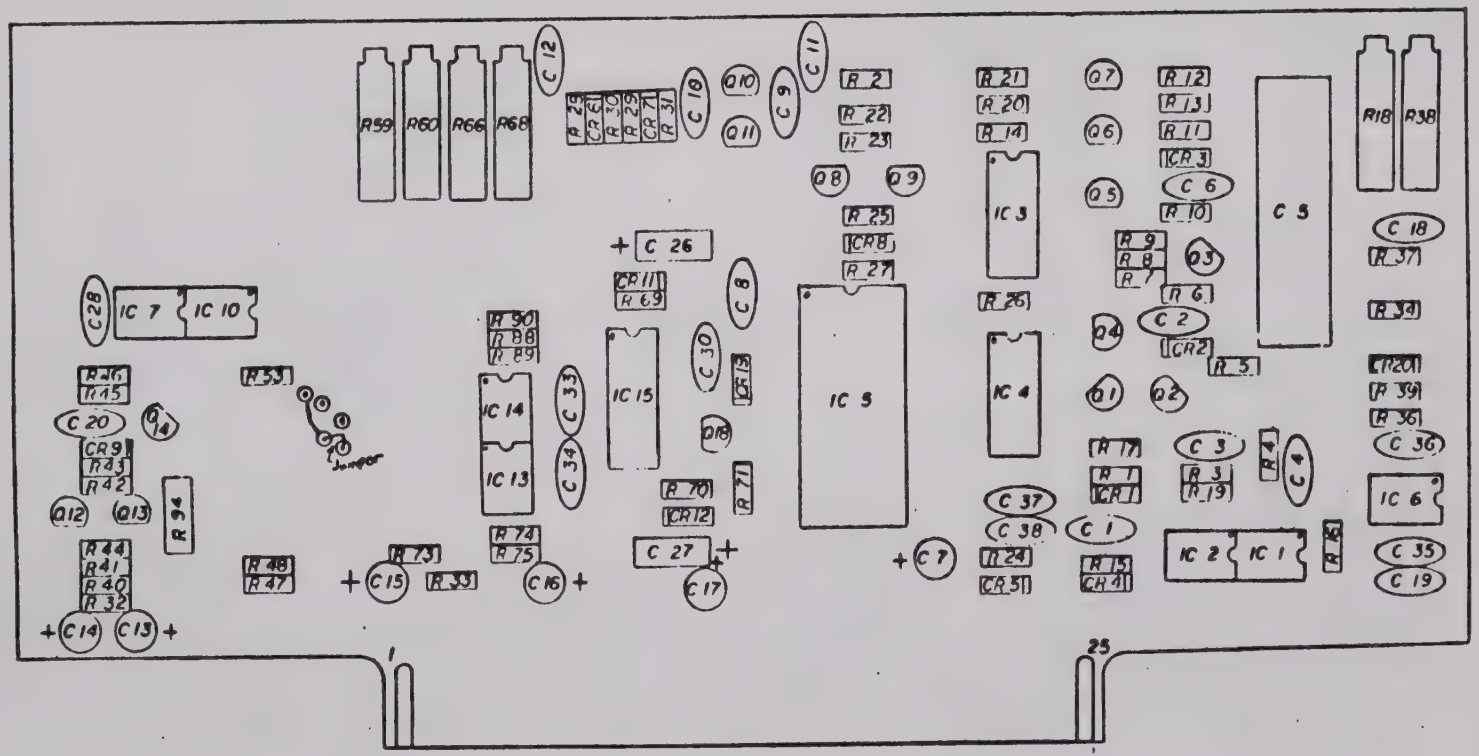
INTEGRA

FUNCTION CONTROLLER

SIZE	FSCM NO.	DWG NO	REV
C	51162	B110006-0	

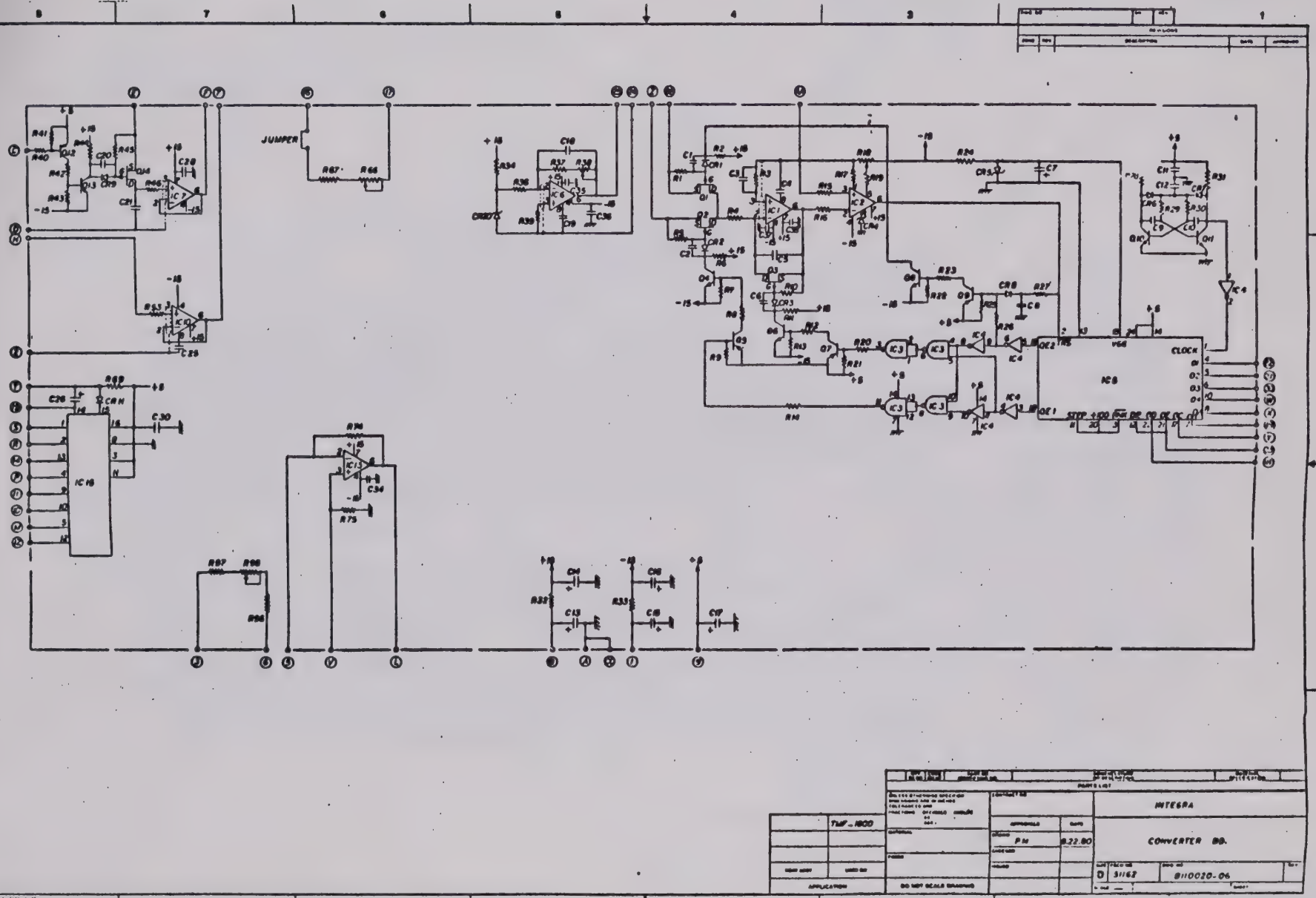
SCALE — SHEET

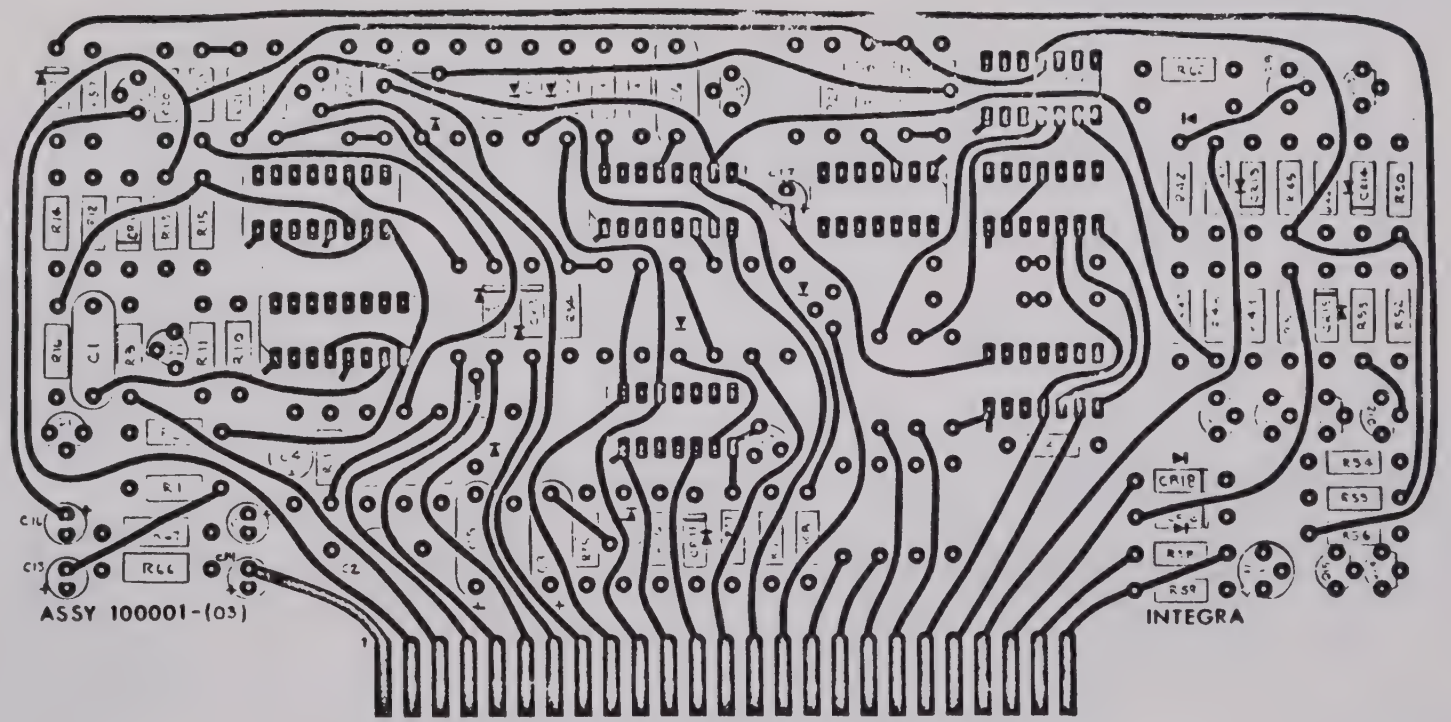
4 3 2 1



	DWM-1900
APPLICATION	

PARTS LIST	
	INTEGRA
	CONVERTER
DRAWN N.P.	8-19-80
SIZE C	FSCM NO. 51162
SCALE 2:1	DWG NO. B210020-05
DO NOT SCALE DRAWING	SHEET

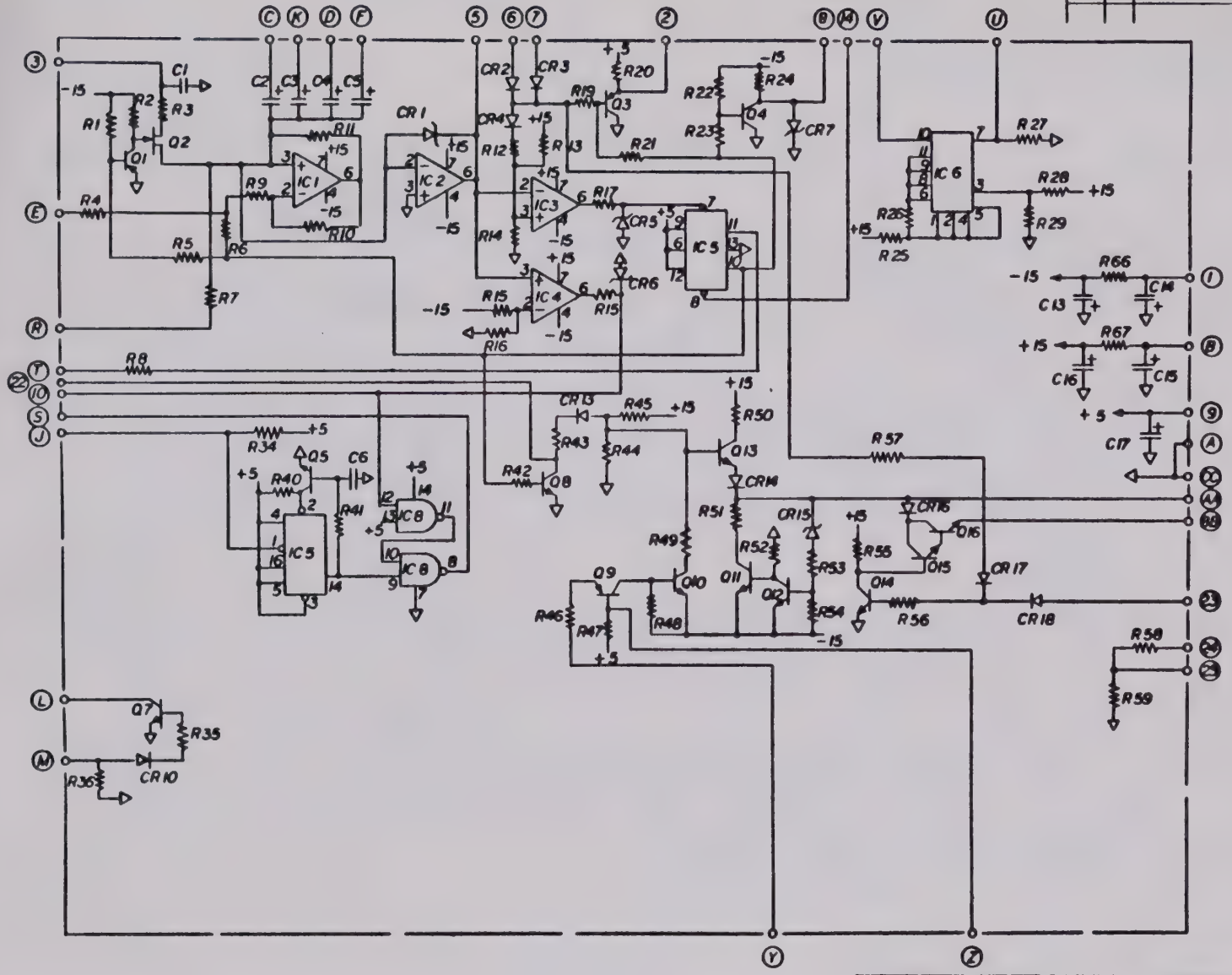

JUMPER
IC 16
IC 8
CLOCK
INTEGRA
CONVERTER BD.
TMF-1800
P/N
B22.80
D
31162
B110020-06
DO NOT SCALE DRAWING



NOTE:- C3-5 NEED TEFLON SLEEVING ON LEADS

MARK DASH NO. ON BRD (-03)

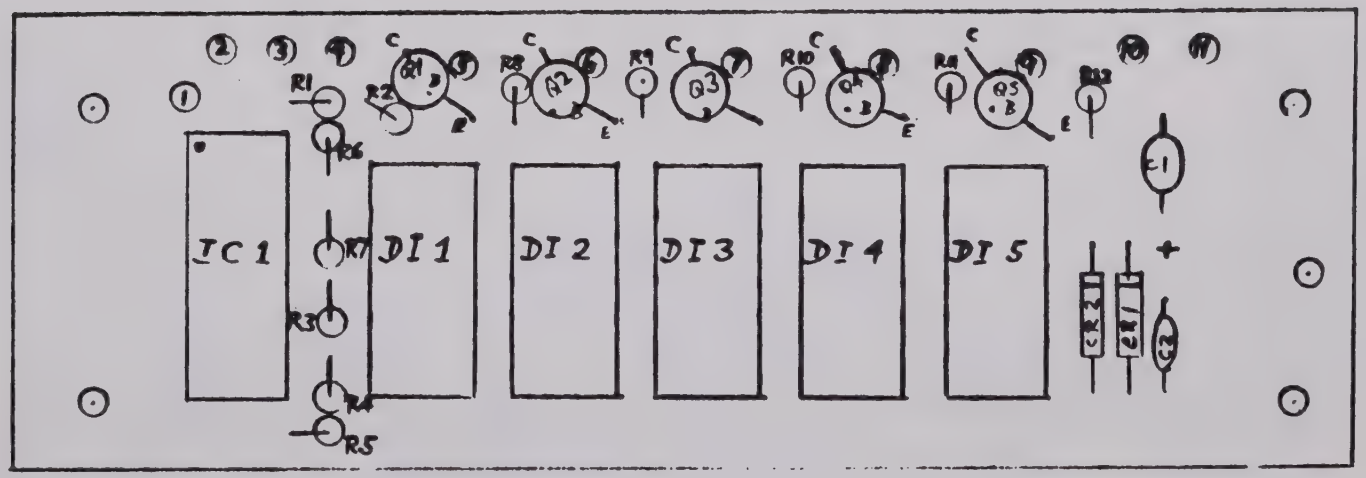
			INTEGRA	
			SWEEP GENERATOR	
	TAF-1800		SIZE C	FSCM NO. 51162
APPLICATION	DO NOT SCALE DRAWING		SCALE	SHEET



TMF-1800		INTEGRA	
APPLICATION	DO NOT SCALE DRAWING	PM 9.3.80	SWEEP GENERATOR BD.
		SIZE C	PROD NO. 51162
		DWG NO. B110001-03	REV
		SCALE —	SHEET

A 210201-01

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



	QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	
PARTS LIST						

	DWM-1800
	TMF-1800
	SA-2000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN W.S.	5/19/77
CHECKED	
ISSUED	

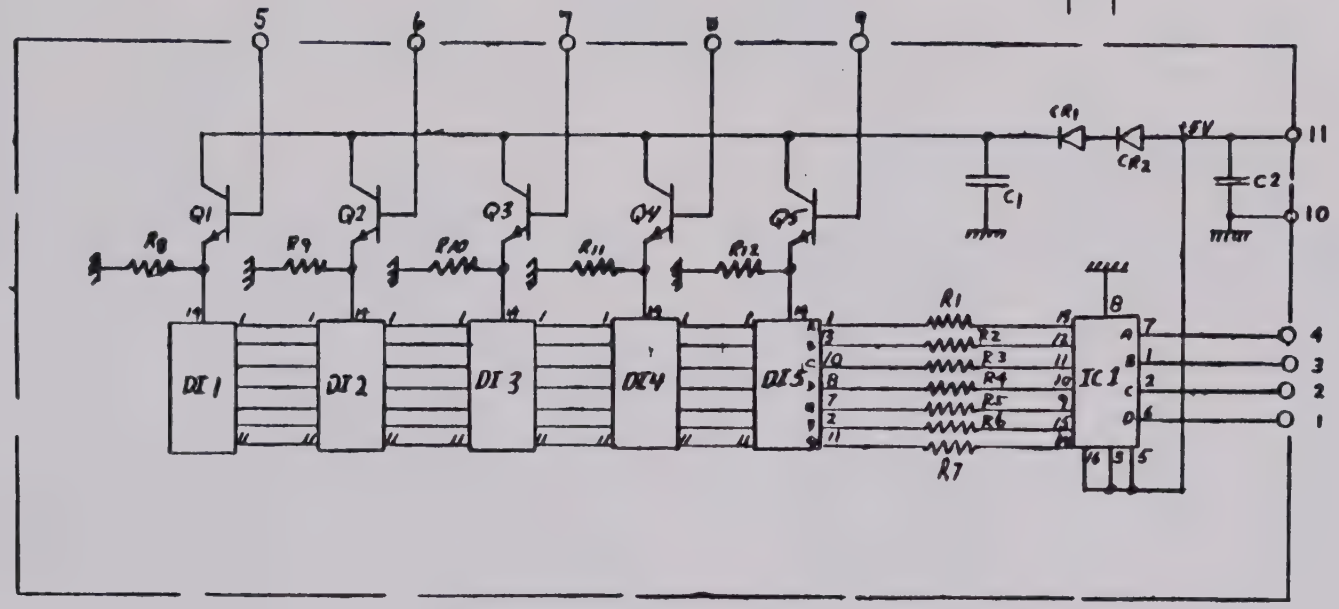
DISPLAY BD.

SIZE	FSCM NO.	DWG. NO.	REV.
A	51162	A210201-01	

SCALE | SHEET

BISHOP GRAPHICS, INC.
REORDER NO. 20509

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



QTY REQD	DODGE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
			PARTS LIST	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
± .XX ± .XXX ±

CONTRACT NO.

	APPROVALS	DATE
DRAWN	Wm. P.	2/14/77
CHECKED		
ISSUED		

MATERIAL

FINISH

DO NOT SCALE DRAWING

	NEXT ASSY	USED ON
	DWM-1800	
	TMF-1800	
	SA-2000	

APPLICATION

DISPLAY BOARD

SIZE	FSCM NO.	DWG. NO.	REV.
B	51162	8110201-01	

SCALE — SHEET

BISHOP GRAPHICS INC
REORDER NO 70810

INTEGRA INC

ENGINEERING PARTS LIST

ORIG W.S.	DATE 11/4/75	51162	B510006-07		1 OF 2
CHECK	DATE 10/18/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		FUNCTION CONTROLLER			
NEXT ASSY A210139-01					

LINE	TC	TRANS DATE	OCCOMME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PCROODCE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 68	70	71 78	79	80		
01			A2	10006-07			FUNCT. CONTR.		010	E	C	0001							F	32	2	10139-01		5		
02			41	10100128			SOCKET 16 PIN		040	E	7	0001							F	32	3	10006-07		5		
03			41	10100124			SOCKET 8 PIN		020	E	7	0001							F	32	3	10006-07		5		
04			19	10100114			IC LIN	U4	010	E	7	0001							F	32	3	10006-07		5		
05			19	10100116			IC LIN	U1,2,3,5,7,8,9,10,11	090	E	7	0001							F	32	3	10006-07		5		
06			30	10100196			TRANS PNP	Q2,3	020	E	7	0001							F	32	3	10006-07		5		
07			30	10100233			TRANS PNP	Q4	010	E	7	0001							F	32	3	10006-07		5		
08			13	10100088			CAP CER .01 UF	C2	010	E	7	0001							F	32	3	10006-07		5		
09			13	10100178			CAP TANT 10 UF	C3-9	070	E	7	0001							F	32	3	10006-07		5		
10			27	10101033			R MF 13.7 K	R6	010	E	7	0001							F	32	3	10006-07		5		
11			27	10100289			R MF 10.0K	R8,10,11,38	040	E	7	0001							F	32	3	10006-07		5		
12			27	10100290			R MF 4.99K	R2,13,14,15	040	E	7	0001							F	32	3	10006-07		5		
13			27	10100291			R MF 9.53K	R23	010	E	7	0001							F	32	3	10006-07		5		
14			27	10100297			R MF 37.4K	R56	010	E	7	0001							F	32	3	10006-07		5		
15			27	10100298			R CARB 20	R1	010	E	7	0001							F	32	3	10006-07		5		
16			27	10100299			R CARB 2.7 K	R9,24,30	030	E	7	0001							F	32	3	10006-07		5		
17			27	10100300			R CARB 5.1K	R12,60	020	E	7	0001							F	32	3	10006-07		5		
18			27	10100110			R CARB 10K	R47,36	020	E	7	0001							F	32	3	10006-07		5		
19			27	10100301			R CARB 1.8K	R16	010	E	7	0001							F	32	3	10006-07		5		
20			27	10100304			R CARB 1K	R43,44,45,48,49,53,54	070	E	7	0001							F	32	3	10006-07		5		
21			27	10100308			R CARB 110K	R42	010	E	7	0001							F	32	3	10006-07		5		
22			27	10100309			R CARB 100K	R46,59	020	E	7	0001							F	32	3	10006-07		5		
23			27	10100310			R CARB 15K	R50,51	020	E	7	0001							F	32	3	10006-07		5		
24			27	10100107			R CARB 100	R61,62	020	E	7	0001							F	32	3	10006-07		5		
25			27	10100313			R CARB 2.7	R69,70 Bend #8	020	E	7	0001							F	32	3	10006-07		5		

SYM	REVISIONS DESCRIPTION	DATE	APPD

NOTES

SHEET OF

BS

INTEGRA INC

ENGINEERING PARTS LIST

ORIG W.S.	DATE 11/4/75	51162	B510006-07		2 OF 2
CHECK [illegible]	DATE 10/18/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		FUNCTION CONTROLLER			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	CCOOMDME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PROD CE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 68	70	71 78	79	80		
01			28	10100319			R VAR 10K 10T	R17,52,55,4,25 5	030	E	7	0001							F	32	3	10006-07		5		
02			28	10100316			R VAR 1K 10T	R22	010	E	7	0001							F	32	3	10006-07		5		
03			28	10100315			R VAR 500 10T	R41	010	E	7	0001							F	32	3	10006-07		5		
04			27	10100220			R MF 499	R39	010	E	7	0001							F	32	3	10006-07		5		
05			27	10101040			R MF 2.21 K	R40	010	E	7	0001							F	32	3	10006-07		5		
06			27	10100269			R CARB 3.3K	R5	010	E	7	0001							F	32	3	10006-07		5		
07			27	10100217			R MF 9.09K	R28	010	E	7	0001							F	32	3	10006-07		5		
08			28	10100320			R VAR 20K	R58	010	E	7	0001							F	32	3	10006-07		5		
09			27	10100589			R MF 15.8K	R29	010	E	7	0001							F	32	3	10006-07		5		
10			27	10100596			R MF 162K	R57	010	E	7	0001							F	32	3	10006-07		5		
11			25	10100006			PWB		010	E	7	0001							F	32	3	10006-07		5		
12			28	10100317			R VAR 2K 10T	R7	010	E	7	0001							F	32	3	10006-07		5		
13			27	10100292			R MF 24.3K	R3,26	020	E	7	0001							F	32	3	10006-07		5		
14																								5		
15																								5		
16																								5		
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21																								5		
22																								5		
23																								5		
24																								5		
25																								5		

SYM	REVISIONS DESCRIPTION	DATE	APPD

NOTES

SHEET OF

B5

INTEGRA INC

ENGINEERING PARTS LIST

ORIG Wm. P.	DATE 5-5-77	51162	B510020-06		1 OF 3
CHECK [illegible]	DATE 10/18/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		CONVERTER ASSY.			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	CC OO MD ME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PC RO OD CE	M	TREE POS	L	NEXT ASSY	S	C	APL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			A2	10020-06			CONVERTER ASSY		010	E	C	0001							F	31	2	10139-01		5		
02			25	10100020			PWB		010	E	7	0001							F	31	3	10020-06		5		
03			41	10100084			SOCKET 14 PIN		020	E	7	0001							F	31	3	10020-06		5		
04			41	10100128			SOCKET 16 PIN		030	E	7	0001							F	31	3	10020-06		5		
05			41	10100525			SOCKET STRIP		020	E	7	0001							F	31	3	10020-06		5		
06			19	10100428			IC LIN	IC1,6	020	E	7	0001							F	31	3	10020-06		5		
07			19	10100120			IC LIN	IC2	010	E	7	0001							F	31	3	10020-06		5		
08			19	10100096			IC DIG	IC3	010	E	7	0001							F	31	3	10020-06		5		
09			19	10100204			IC DIG	IC4	010	E	7	0001							F	31	3	10020-06		5		
10			19	10100429			IC DIG	IC5	010	E	7	0001							F	31	3	10020-06		5		
11			19	10100116			IC LIN	IC7,10,13	030	E	7	0001							F	31	3	10020-06		5		
12			19	10100458			IC DIG	IC15	010	E	7	0001							F	31	3	10020-06		5		
13			30	10100129			TRANS FET	Q1,2,3,14	040	E	7	0001							F	31	3	10020-06		5		
14			30	10100092			TRANS NPN	Q4,6,8,10,11,13	060	E	7	0001							F	31	3	10020-06		5		
15			30	10100095			TRANS PNP	Q5,7,9,12	040	E	7	0001							F	31	3	10020-06		5		
16			15	10100019			DIODE	CR1-3,6-9,11,12	090	E	7	0001							F	31	3	10020-06		5		
17			15	10100016			DIODE ZEN 5.1V	CR4	010	E	7	0001							F	31	3	10020-06		5		
18			15	10100430			DIODE ZEN 12V	CR5	010	E	7	0001							F	31	3	10020-06		5		
19			13	10100431			C MICA 27 PF	C1,2,6,20	040	E	7	0001							F	31	3	10020-06		5		
20			13	10100432			C MICA 500PF	C3	010	E	7	0001							F	31	3	10020-06		5		
21			13	10100433			C MICA 150PF	C4,19	020	E	7	0001							F	31	3	10020-06		5		
22			13	10100156			C FILM .68UF	C5	010	E	7	0001							F	31	3	10020-06		5		
23			13	10100178			C TANT 10 UF	C7,13-17	060	E	7	0001							F	31	3	10020-06		5		
24			13	10100088			C CER .01UF	C8,11,12,18,28,30,33-38	120	E	7	0001							F	31	3	10020-06		5		
25			13	10100434			C MICA 91 PF	C9,10	020	E	7	0001							F	31	3	10020-06		5		

SYM	REVISIONS DESCRIPTION	DATE	APPD

NOTES

SHEET OF

BS

INTEGRA INC

ENGINEERING PARTS LIST

ORIG Wm. P.	DATE 5-5-77	51162	B510020-06		2 OF 3
CHECK [illegible]	DATE 10/18/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		CONVERTER ASSY.			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	OCCOOMDME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PROD CE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			13	10100459			CAP TANT 22 UF	C27	010	E	7	0001							F	31	3	10020-06		5		
02			27	10100309			R CARB 100 K	R1,5,10,45	040	E	7	0001							F	31	3	10020-06		5		
03			27	10100225			R CARB 33	R2,6,8,11,12,23,42,44,	090	E	7	0001							F	31	3	10020-06		5		
04								69																5		
05			27	10100436			R MF 49.9 K	R3	010	E	7	0001							F	31	3	10020-06		5		
06			27	10100110			R CARB 10 K	R7,13,22,43	040	E	7	0001							F	31	3	10020-06		5		
07			27	10100304			R CARB 1 K	R9,21,25,41,46,53	060	E	7	0001							F	31	3	10020-06		5		
08			27	10100229			R CARB 3.9 K	R14,20,26,40	040	E	7	0001							F	31	3	10020-06		5		
09			27	10100102			R CARB 10	R15,16	020	E	7	0001							F	31	3	10020-06		5		
10			27	10100410			R CARB 10 M	R17	010	E	7	0001							F	31	3	10020-06		5		
11			27	10100443			R CARB 4.7 M	R19	010	E	7	0001							F	31	3	10020-06		5		
12			27	10100238			R CARB 120	R24	010	E	7	0001							F	31	3	10020-06		5		
13			27	10100269			R CARB 3.3 K	R27	010	E	7	0001							F	31	3	10020-06		5		
14			27	10100437			R CARB 330	R28,31	020	E	7	0001							F	31	3	10020-06		5		
15			27	10100438			R MF 20.5 K	R29	010	E	7	0001							F	31	3	10020-06		5		
16			27	10100439			R MF 24.9 K	R30	010	E	7	0001							F	31	3	10020-06		5		
17			27	10100313			R CARB 2.7	R32,33	020	E	7	0001							F	31	3	10020-06		5		
18			27	10100295			R MF 1.10K	R34	010	E	7	0001							F	31	3	10020-06		5		
19			27	10100440			R MF 6.19K	R36	010	E	7	0001							F	31	3	10020-06		5		
20			27	10100441			R MF 4.75 K	R37,67	020	E	7	0001							F	31	3	10020-06		5		
21			27	10100299			R CARB 2.7K	R39	010	E	7	0001							F	31	3	10020-06		5		
22			27	10100289			R MF 10.0K	R89,88	020	E	7	0001							F	31	3	10020-06		5		
23			27	10100300			R CARB 5.1K	R75,90	020	E	7	0001							F	31	3	10020-06		5		
24			27	10100460			R CARB 16K	R70	010	E	7	0001							F	31	3	10020-06		5		
25			28	10100321			R VAR 50K 10T	R18	010	E	7	0001							F	31	3	10020-06		5		

REVISIONS

SYM	DESCRIPTION	DATE	APPD

NOTES

SHEET OF

B5

INTEGRA INC

ENGINEERING PARTS LIST

ORIG Wm. P.	DATE 5-5-77	51162	B510020-06		3 OF 3
CHECK	DATE 10/18/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		CONVERTER ASSY.			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	CC OO MD ME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PC RO OD CE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			28	10100316			R VAR 1K 10T	R38,66	020	E	7	0001							F	31	3	10020-06		5		
02			15	10100435			DIØDE ZEN 6.2V	CR20	010	E	7	0001							F	31	3	10020-06		5		
03			41	10100124			SØCKET 8 PIN		020	E	7	0001							F	31	3	10020-06		5		
04			13	10100547			CAP FILM 22UF	C21	010	E	7	0001							F	31	3	10020-06		5		
05			27	10100821			R MF 66.5K	R4	010	E	7	0001							F	31	3	10020-06		5		
06			27	10100286			R MF 20.0K	R74	010	E	7	0001							F	31	3	10020-06		5		
07			13	10100879			CAP .001 UF.	C26	010	E	7	0001							F	31	3	10020-06		5		
08			28	10100568			R VAR 1K 1T	R95	010	E	7	0001							F	31	3	10020-06		5		
09			27	10100291			R MF 9.53K	R96	010	E	7	0001							F	31	3	10020-06		5		
10			27	10100465			R CARB 1	R97	010	E	7	0001							F	31	3	10020-06		5		
11																								5		
12																								5		
13																								5		
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22																								5		
23																								5		
24																								5		
25																								5		

SYM	REVISIONS DESCRIPTION	DATE	APPD

NOTES

SHEET OF

B5

INTEGRA INC

ENGINEERING PARTS LIST

ORIG Wm. P.	DATE 2/17/79	51162	B510202-01		1 OF 1
CHECK	DATE	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON	TMF-1800	DISPLAY BOARD			
NEXT ASSY	A110172-01				

LINE NO	TC	TRANS DATE	CC COMME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PC ROD CE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			A2	10202-01			DISPLAY BD		010	E	C	0001							F	3411	4	10172-01		5		
02			25	10101111			PWB		010	E	7	0001							F	3411	5	10202-01		5		
03			19	10100630			IC DIG	IC1	010	E	7	0001							F	3411	5	10202-01		5		
04			30	10100092			TRANS NPN	Q1-5	050	E	7	0001							F	3411	5	10202-01		5		
05			17	10101057			DISPLAY 7 SEG	DS1-5	050	E	7	0001							F	3411	5	10202-01		5		
06			27	10101131			R CARB 43	R1-R7	070	E	7	0001							F	3411	5	10202-01		5		
07			27	10100304			R CARB 1K	R8-R12	050	E	7	0001							F	3411	5	10202-01		5		
08			13	10100178			CAP TANT 10UF	C1-C2	020	E	7	0001							F	3411	5	10202-01		5		
09			15	10100167			DIØDE	CR1,2	020	E	7	0001							F	3411	5	10202-01		5		
10																								5		
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SYM	REVISIONS DESCRIPTION	DATE	APPD

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SHEET OF

B5

INTEGRA INC

ENGINEERING PARTS LIST

ORIG E.S.	DATE 3/2/79	51162	B510200-01		1 OF 1
CHECK	DATE	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		PANEL REGULATOR			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	COMMODITY	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PROD CE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			A1	10200-01			PANEL REG		010	E	C	0001							F	34	2	10139-01		5		
02			19	10100042	X		IC REG	VR 1	010	E	7	0001							F	34	3	10200-01		5		
03			19	10100044	X		IC REG	VR 2	010	E	7	0001							F	34	3	10200-01		5		
04			19	10100045	X		IC REG	VR 3	010	E	7	0001							F	34	3	10200-01		5		
05			72	10100516	X		PLATE		010	E	3	0001						MB	F	34	3	10200-01		5		
06			72	10101089			PLATE		010	E	7	0001							F	34	3	10100516		5		
07			43	10100143	X		MOUNTS		030	E	7	0001							F	34	3	10200-01		5		
08			43	10100188	X		INSULATOR		030	E	7	0001							F	34	3	10200-01		5		
09			13	10100178	X		CAP TANT 10UF	C-3,4,5,	030	E	7	0001							F	34	3	10200-01		5		
10			41	10100501	X		SPACER		040	E	7	0001							F	34	3	10200-01		5		
11			43	10100144	X		LUGS		060	E	7	0001							F	34	3	10200-01		5		
12			42	10007-03			SCREW 6-3/8		040	E	7	0001							F	34	3	10200-01		5		
13			42	10007-04			SCREW 6-1/2		100	E	7	0001							F	34	3	10200-01		5		
14			43	10100074			WASHER FLAT #6		100	E	7	0001							F	34	3	10200-01		5		
15			43	10100075			WASHER LOCK #6		140	E	7	0001							F	34	3	10200-01		5		
16			13	10100089	X		C TANT 1 UF	C-6	010	E	7	0001							F	34	3	10200-01		5		
17																								5		
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SYM	REVISIONS DESCRIPTION	DATE	APPD

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SHEET OF

B5

INTEGRA INC

ENGINEERING PARTS LIST

ORIG Wm P.	DATE 5/16/78	51162	B510001-03		1 OF 3
CHECK [illegible]	DATE 9/15/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		SWEEP GENERATOR			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	CC CO MD ME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PC RO OD CE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	46 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			22	10001-03			SWEEP GEN		010	E	C	0001							F	33	2	10139-01		5		
02			25	10100001			PWB		010	E	7	0001							F	33	3	10001-03		5		
03			41	10100084			SOCKET 14 PIN		020	E	7	0001							F	33	3	10001-03		5		
04			41	10100128			SOCKET 16 PIN		030	E	7	0001							F	33	3	10001-03		5		
05			19	10100116			IC LIN	U1,2,9	030	E	7	0001							F	33	3	10001-03		5		
06			19	10100117			IC DIG	U5	010	E	7	0001							F	33	3	10001-03		5		
07			19	10100118			IC LIN	U6	010	E	7	0001							F	33	3	10001-03		5		
08			19	10100096			IC DIG	U8	010	E	7	0001							F	33	3	10001-03		5		
09			19	10100120			IC LIN	U3,4	020	E	7	0001							F	33	3	10001-03		5		
10			30	10100092			TRANS NPN	Q4,5,7,8,10-15	100	E	7	0001							F	33	3	10001-03		5		
11			30	10100095			TRANS PNP	Q1,9,3	030	E	7	0001							F	33	3	10001-03		5		
12			30	10100121			TRANS NPN	Q16	010	E	7	0001							F	33	3	10001-03		5		
13			30	10100129			TRANS FET	Q2	010	E	7	0001							F	33	3	10001-03		5		
14			13	10100088			CAP CER .01 UF	C1	010	E	7	0001							F	33	3	10001-03		5		
15			13	10100123			CAP TANT 3.3UF	C3	010	E	7	0001							F	33	3	10001-03		5		
16			13	10100158			CAP TANT 33 UF	C4	010	E	7	0001							F	33	3	10001-03		5		
17			13	10100159			CAP TANT 330UF	C5	010	E	7	0001							F	33	3	10001-03		5		
18			13	10100160			CAP FIL .033UF	C6	010	E	7	0001							F	33	3	10001-03		5		
19			13	10100178			CAP TANT 10 UF	C13-17	050	E	7	0001							F	33	3	10001-03		5		
20			15	10100183			DIODE ZEN 10V	CR1	010	E	7	0001							F	33	3	10001-03		5		
21			15	10100019			DIODE	CR2-4,10,11,13,14,17,18	090	E	7	0001							F	33	3	10001-03		5		
22			15	10100016			DIODE ZEN 5.1V	CR5,6,7	030	E	7	0001							F	33	3	10001-03		5		
23			15	10100184			DIODE ZEN 20V	CR15	010	E	7	0001							F	33	3	10001-03		5		
24			15	10100167			DIODE	CR16	010	E	7	0001							F	33	3	10001-03		5		
25			27	10100185			R CARB 68K	R1,19,22	030	E	7	0001							F	33	3	10001-03		5		

SYM	REVISIONS DESCRIPTION	DATE	APPD

NOTES

SHEET OF

B5

INTEGRA INC

ENGINEERING PARTS LIST

ORIG Wm. P.	DATE 5/16/78	51162	B510001-03		2 OF 3
CHECK [illegible]	DATE 9/15/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1800		SWEEP GENERATOR			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	CCOMME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PCROD CE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			27	10100310			R CARB 15K	R2,3,52,56	040	E	7	0001							F	33	3	10001-03		5		
02			27	10100186			R CARB 27	R4	010	E	7	0001							F	33	3	10001-03		5		
03			27	10100110			R CARB 10K	R5,20,21,23,34,36,37,40	110	E	7	0001							F	33	3	10001-03		5		
04								-42,46																5		
05			27	10100094			R CARB 240	R12	010	E	7	0001							F	33	3	10001-03		5		
06			27	10100192			R CARB 2K	R17,18,24	030	E	7	0001							F	33	3	10001-03		5		
07			27	10100093			R CARB 680	R43	010	E	7	0001							F	33	3	10001-03		5		
08			27	10100222			R CARB 8.2K	R ,54	020	E	7	0001							F	33	3	10001-03		5		
09			27	10100223			R CARB 11K	R45	010	E	7	0001							F	33	3	10001-03		5		
10			27	10100224			R CARB 470 K	R47	010	E	7	0001							F	33	3	10001-03		5		
11			27	10100225			R CARB 33K	R48	010	E	7	0001							F	33	3	10001-03		5		
12			27	10100105			R CARB 5.6K	R49	010	E	7	0001							F	33	3	10001-03		5		
13			27	10100226			R CARB 750	R50	010	E	7	0001							F	33	3	10001-03		5		
14			27	10100227			R CARB 2.4K	R51	010	E	7	0001							F	33	3	10001-03		5		
15			27	10100228			R CARB 56K	R35,53	020	E	7	0001							F	33	3	10001-03		5		
16			27	10100229			R CARB 3.9K	R55,6,61	030	E	7	0001							F	33	3	10001-03		5		
17			27	10100230			R CARB 47K	R57	010	E	7	0001							F	33	3	10001-03		5		
18			27	10100231			R CARB 1.1K	R58	010	E	7	0001							F	33	3	10001-03		5		
19			27	10100302			R CARB 51K	R59	010	E	7	0001							F	33	3	10001-03		5		
20			27	10100313			R CARB 2.7	R67,66 Bend #8	020	E	7	0001							F	33	3	10001-03		5		
21			27	10100296			R MF 1.30K	R13,25	020	E	7	0001							F	33	3	10001-03		5		
22			27	10100187			R MF 1.00K	R7,9,10,11,14	050	E	7	0001							F	33	3	10001-03		5		
23			27	10100189			R MF 3.57K	R15	010	E	7	0001							F	33	3	10001-03		5		
24			27	10100190			R MF 100	R16	010	E	7	0001							F	33	3	10001-03		5		
25			27	10100193			R MF 8.25 K	R26	010	E	7	0001							F	33	3	10001-03		5		

SYM	REVISIONS DESCRIPTION	DATE	APPD

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SHEET OF

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INTEGRA INC

ENGINEERING PARTS LIST

ORIG Wm. P.	DATE 5/16/78	51162	B510001-03		3 OF 3
CHECK [illegible]	DATE 9/15/78	CODE IDENT	ASSEMBLY NO	REV	SHEET
APPD	DATE	TITLE			
USED ON TMF-1300		SWEEP GENERATOR			
NEXT ASSY A210139-01					

LINE NO	TC	TRANS DATE	CCOMME	PART NUMBER	SUF	REV	DESCRIPTION		QUA	UM	SRC	EFFE FROM	CHG AUTH	SYM	MTL NO	MTL QTY	UM	PROCODE	M	TREE POS	L	NEXT ASSY	S	C	ADPL	NOTE
	1	2 6	7 8	9 16	17	18	19 32		40 42	43	44	45 48	49 52	53	54 56	57 59	60	61 62	63	64 69	70	71 78	79	80		
01			27	10100220			R MF 499	R28	010	E	7	0001							F	33	3	10001-03		5		
02			27	10100295			R MF 1.10K	R29	010	E	7	0001							F	33	3	10001-03		5		
03																										
04			27	10100269			R CARB 3.3K	R8	010	E	7	0001							F	33	3	10001-03		5		
05			13	10100488			C,FILM .47	C2	010	E	7	0001							F	33	3	10001-03		5		
06			41	10100124			SOCKET		010	E	7	0001							F	33	3	10001-03		5		
07			27	10100465			R CARB 1 ØHM	R60	010	E	7	0001							F	33	3	10001-03		5		
08			27	10100522			R CARB 4.7K	R44	010	E	7	0015												5		
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SYM	REVISIONS DESCRIPTION	DATE	APPD

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